THE MAC Flyer

NOVEMBER 1986

Comments from the new MAC Inspector General ... Page 4

THE MAC Flyer

For Greater Safety in MAC Air Operations

November 1986 | MACRP 127-5 | VOL XXXIII NO. 11

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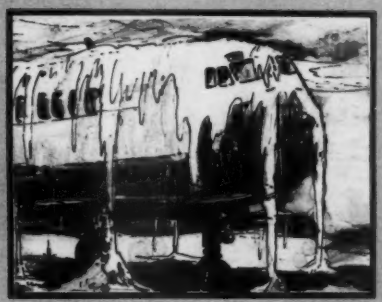

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The MAC Flyer is published by the Director of Safety, Military Airlift Command. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/XGFE, Scott AFB, IL 62225-5101, or Autovon 576-3634. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

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Mission Unreasonable!

We're recruiting you!

Good morning, Dim. On the screen in front of you is a replica of *The MAC Flyer*. One of the most unique features of this periodical is the lack of a spring-loaded subscription postcard set to launch itself into your soup when you open the first page. But the part of this magazine we're most interested in today is their annual solicitation from the readership. The periodical's charter is flight safety, and one of the innovative features used is a Flight Safety Writing Contest (FSWC). But, the journal is in trouble.

It seems a very large organization of not-so-nice persons is carrying out a devious series of atrocities aimed at undermining the 1987 edition of the FSWC.

The computer-generated image you now see is of Mr. Aba Dbadmon. Our sources in Grimbados and Aridia confirm—*he* is behind the effort to stop potential winners from mailing their stories in. The facts are intense and undeniable, so brace yourself.

In southern Aridia, an astute aviation-minded author announced an alliterative account. The victim set about mailing the story with regrettable fanfare. He was nabbed enroute to the mailbox and taken to a small room overlooking a shrimp deveining factory. Amid the decomposing refuse he was forced to read every FSWC ad ever written. The punishment continued even after he fouled himself and became violently ill—finally, he could take it no more. He was discovered, the next morning, cowering in a corner of his room clutching a bag of best-selling novels. He's been in therapy since.

This morning, in Grimbados, a young contestant was found sitting at a table, his fingers bloody from the attempt to rip his story into ever finer bits. His innovative theme about a circus employee who paid inadequate attention to the process of training blocks and later crashed in a box canyon was forever lost.

Your mission, should you decide to accept it, is to write a story and enter it in accordance with *THE RULES*. Your sacrifice, as bait, will protect the rest of the entrants. Good luck! This floppy disc will permanently store itself before . . . .

THE RULES

The 1986 MAC Flight Safety Writing Contest is conducted according to MACR 900-3 and these rules. All entries must be original, unpublished and postmarked no later than 31 March 1986. Stories must be between 1,000 and 3,000 words long (about 6 to 14 double-spaced typed pages). Poetry should be about 75 to 100 lines. Entries must contain an *aviation safety/mishap prevention message*. Manuscripts must be double-spaced, typed and submitted in two copies. Identify entries by title only and attach a cover sheet showing the author's name, address, duty phone number and unit. The cover sheet must contain a brief autobiography.

The contest is open to anyone. Entries qualifying under the above rules earn their author a free one-year subscription to *The MAC Flyer*. However, contest prizes (desk sets and plaques) may only be awarded to military members and civilian employees of the Department of the Air Force or Air Reserve Forces. Other entrants may be selected for Honorable Mention in a special category. All winning stories will be published in *The MAC Flyer*. Entries should be addressed to:

Flight Safety Writing Contest
HQ MAC/IGFE
SCOTT AFB, IL 62225-5101

TMF INTERVIEW

The MAC Inspector General on Safety

Interview by Major Thomas C. Weinzierl
Supervising Editor

(*Editors Note:* Brig. Gen. James D. Kellim assumed duties as the Military Airlift Command Inspector General in August 1986. Prior to this assignment, General Kellim served as vice commander of the Military Traffic Management Command, Washington, D.C. He has held a variety of command positions including commander, 310th Tactical Airlift Squadron, Republic of Vietnam; 62d Military Airlift Wing, McChord Air Force Base, WA; and the Air Reserve Personnel Center, Denver, CO. In addition, he served as Director, Special Assignment Airlift Missions; Director, Airlift Operations; Chief, Capabilities Branch; and Chief, Resource Management Branch in the Current Operations Division, Office of the Deputy Chief of Staff for Operations during a previous tour at HQ MAC. General Kellim also served as the Military Airlift Command senior representative for C-X (now designated C-17), Source Selection.

General Kellim is a command pilot with more than 6,500 flying hours, including more than 300 combat hours in the Republic of Vietnam.)

TMF—General Kellim, please tell us a little about your flight experience.

IG—My first flying duties were as a navigator and electronic warfare officer in the Air Training Command at Keesler AFB, MS, and Mather AFB, CA.

After pilot training, all of my flight duties were in MAC with the exception of a year in Vietnam flying the C-7.

I started out in C-130s in the 41st MAS at Charleston. The squadron converted to the C-141 in 1966 so I had about two years there in each weapons system. In 1968, I was fortunate enough to be selected as initial cadre in the C-9, which began my first of four tours at Scott. I also flew the T-39 at Scott during a subsequent assignment here.

I was at McChord AFB from 1976 to 1979 and flew the C-130 as the ADO, then flew the C-141 as the DO, Vice-Commander, and Wing Commander.

TMF—Were there any experiences in your career which made a safety believer of you?

IG—I've been fortunate. Nothing of that nature has happened to me, but over the years, I've seen friends and people in my organization suffer, and in some cases die, needlessly. Complacency and other human errors were the cause in most of these mishaps. Disregard for simple safety measures such as fastening a seatbelt in a car, not wearing a helmet or receiving proper training to ride a motorcycle, have been other causes. All of these things made a believer of me. These folks would still be alive today had they taken the time to make sure whatever they were doing was being done safely.

TMF—You've held three commands in your career. How do you view the commander's role in safety?

IG—The commander *is* the unit's safety officer. The safety program is his or her responsibility, and it must have the commander's imprint. The commander has to be involved with it on a daily basis. Preserving resources and people is just as much his job as maintaining his forces in a high state of combat readiness. How well the commander does both of these is a measure of his true effectiveness as a leader. A strong safety program helps him keep his command at peak readiness. Losing capability through needless mishaps is doing our adversaries' job.

How the commander develops and presents his or her safety program is very important. You must get your safety

MAC Inspector General

program across to your people in a way they can relate to. The program can look great on paper, but if it isn't supported by your people, it's worthless. It all comes down to one simple fact, as in all other aspects of being a leader—the commander leads the way in developing a healthy safety attitude that is ingrained in everything we do. It must be a mindset that functions automatically whether in the air or in our support jobs on the ground.

TMF—In the past several years, we've consistently experienced about two operations-related mishaps for every materiel-related mishap. How do you feel we can reduce this tendency to "do it to ourselves"?

IG—We have to get the people involved and motivated to improve the way the job is done. We're at the point where one or two fewer Class A or B mishaps a year represent a 25 to 50 percent reduction in mishaps. I'm convinced, with the quality of people we have, we can accomplish such a reduction. Safety has and always will focus on individual responsibility. It's up to commanders and supervisors at every level to maintain that focus.

TMF—What is our biggest asset in mishap prevention?

IG—That's easy. Our people. But to accomplish this, our people must be given the right kind of equipment to do the job, be properly trained, then motivated to do it safely.

TMF—What is our biggest obstacle to preventing mishaps?

IG—There are really several things that create obstacles to mishap prevention. Stress, fatigue, risk, all can combine to cause someone to lose his safety attitude. Keeping a good attitude toward doing the job safely is tough under the pressure of long days and multiple time zones. Now, add in the desire to complete the mission and the obstacle is clear.

But, if always doing the job safely is ingrained in us, then the correct decision that prevents mishaps will be made.

TMF—Do you perceive a conflict between moving the mission—making the on-time departure—and doing the job safely? Some crewmembers feel that by doing one, you may sometimes compromise the other.

IG—That question has been around since I started flying and will be around for as long as we fly airplanes. There is a need to keep our missions moving on schedule; that's one part of our job that will never change. However, there is never room in our business to compromise safety. Safety and mission accomplishment go hand-in-hand. There's also room for leaders, including aircraft commanders, to exercise their own best judgment. No regulation, or plan, or Dash One can cover every possibility. But if we have the proper safety mindset, we'll be able to exercise that judgment and correctly balance the need for a safe operation against the demands of the mission.

TMF—Do you have any advice for commanders in developing and running their safety programs?

IG—The words might be overworked but I still don't know a better way to say it than that the commander must be totally involved in safe mission accomplishment. It is an absolute that the people of an organization, from top to bottom, will emphasize and pay attention to what the "boss" emphasizes and pays attention to. If the "boss" is casual about safety, you can bet casualness about safety will become the order of the day. No commander can afford that.

Safety is a discipline that must be a part of every aspect of a unit's activities. The responsibility to make sure that happens lies with the commander, but the commander should develop and use his safety staff to their fullest potential to help make this happen. The safety officer is a key member of the staff whose advice and counsel should be sought on anything remotely related to safety. This will motivate the safety officer to do the best job he can and will also reinforce the commander's concern about safety to the entire unit.

Finally, safety can't be just a word. It must be action! Visible action! It involves proper training for our people; the proper equipment; good living conditions; concern for families, and a myriad other things that make for pride, high morale and a good organization. Add them together, mix them with that mindset that says "do it safely or don't do it" and the commander is going to have a very successful and safisfying command.

TMF—Do you have any advice to offer the safety people in MAC?

IG—Make your program active, not reactive. The challenge to any safety officer is preventing the next mishap, not investigating the last one. Be visible. Maintain amiable relations with *all* the people in the unit. Maintaining your credibility and accessibility will help when you need some assistance from a specific area. You need all the people in an organization to help prevent mishaps, and they'll be much more willing to help if they perceive you have only one goal in mind: to prevent mishaps.

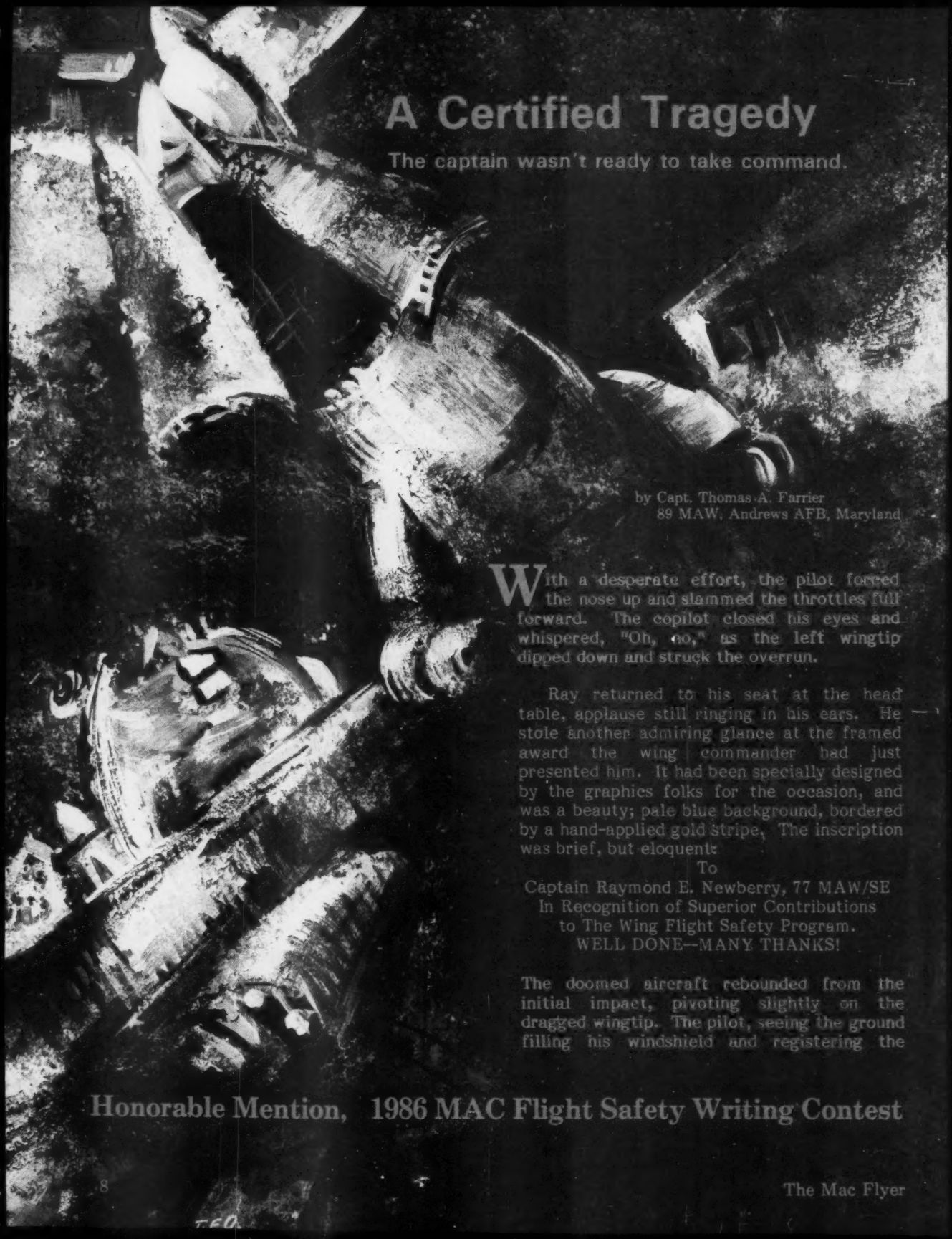
You're the commander's representative, get to know what he thinks about safety and how he wants the mission accomplished. Know the mission. Know where the pitfalls are in the mission and find ways to avoid them. You may have to be the commander's conscience at times. That's the tough part of the job. Telling the boss he's wrong is never easy, but if he's a professional he'll appreciate your advice. Help your boss stay visible in emphasizing safety. As I said earlier, the command will pay attention to what the boss pays attention to.

TMF—What will be the overall thrust of your safety efforts as MAC's Inspector General?

IG—Instilling a safety attitude in every member of the Military Airlift Command. Lost lives and destroyed airplanes equal lost capability. This nation can't afford to lose the capability to deter aggression—and should deterrence fail—to fight and win. I hope we can instill in every commander, every supervisor, every airman on the flightline an attitude that safety must be an integral part of the mission. We can't have successful mission accomplishment without *safe* mission accomplishment. Our people and resources are too precious to waste.

Finally, we will emphasize that the commander is the unit's chief safety officer. It's up to him or her to make the safety program and, in the end, the unit itself effective.

Thank you, General Kellim.



A Certified Tragedy

The captain wasn't ready to take command.

by Capt. Thomas A. Farrier
89 MAW, Andrews AFB, Maryland

With a desperate effort, the pilot forced the nose up and slammed the throttles full forward. The copilot closed his eyes and whispered, "Oh, no," as the left wingtip dipped down and struck the overrun.

Ray returned to his seat at the head table, applause still ringing in his ears. He stole another admiring glance at the framed award the wing commander had just presented him. It had been specially designed by the graphics folks for the occasion, and was a beauty; pale blue background, bordered by a hand-applied gold stripe. The inscription was brief, but eloquent:

To
Captain Raymond E. Newberry, 77 MAW/SE
In Recognition of Superior Contributions
to The Wing Flight Safety Program.
WELL DONE--MANY THANKS!

The doomed aircraft rebounded from the initial impact, pivoting slightly on the dragged wingtip. The pilot, seeing the ground filling his windshield and registering the

Honorable Mention, 1986 MAC Flight Safety Writing Contest

sudden yaw, brought the nose up even more and rolled the aircraft to the right. The combination of excess pitch, sudden deceleration, and violent maneuvering made the stall inevitable.

The luncheon was winding down quickly, and people started drifting out to head back to work. The 17 MAS scheduler slid into a vacant chair next to Ray, grinning, and shook his hand. "Not bad for a wing weenie," he laughed. "Now, if you could only fly the way you make speeches!"

Ray grinned back in reply. He was in far too fine a mood to be bothered by the good-natured kidding. As a former flight examiner in the squadron, he knew he was one of the best pilots on base. He was also waiting; the scheduler obviously had something interesting to tell him, and was just delaying in order to make a few more jokes. He leaned back and stifled a yawn. However, the scheduler's next words brought him straight up in his chair.

The aft fuselage and right outboard engine nacelle hit the ground almost simultaneously. Through the hazy, still, night air, the tower controller saw the first sparks and flames caused by the impact. She reached for the crash phone.

"Care for a free ride to Germany tonight?" inquired the scheduler, amused by Ray's sudden expression of interest.

Ray hesitated. He had been up half the previous night packing his hold baggage. Then he was treated to a 0515 call from his sponsor at Rhein-Main, who wanted to let him know of a highly desirable apartment which had just become available. "It won't last long," the sponsor warned him, "the location is great, 20 minutes from the base, tops, it's in a really fine neighborhood; and your wife loves it. She's been insisting you need to see it before she makes a commitment."

The tremendous force of the impact distorted the fuselage. The left side of the aircraft tore open just behind the wing. The left engine, still developing full power, hurled the left wing and forward part of the aircraft in a vicious arc around the partially buried right wing. Baggage, cargo, passengers, and crewmembers were spilled onto the runway. A few lucky ones were to survive . . . most did not.

"Well, I don't know . . ." Ray said dubiously, with thoughts of crew rest, German beer, his aching back, and his wife swirling around in a confused mass.

"Okay, look. I'll level with you . . . we're in a bind. A Bentwaters A-10 broke 'big time' at a German forward operating base. It needs an engine change. The priority on this went right up to the moon for some reason, so we've been tasked to take in a new engine on the regular Germany run tonight. Here's the problem: they don't want us two-hopping the mission . . . they want us to go from here direct to the GAF base, bypassing both the regular stop at Lajes *and* Rhein-Main. We're supposed to drop that thing right in their laps. Lord only knows who the pilot is, but he must have some pretty amazing clout."

Ray considered this. "You're saying that the mission is going direct to Germany, on one fuel hop?"

"Yeah, but we're hitting a tanker that's rotating back to Fairford early, just for our benefit. Like I said, the priority is amazing. The one problem we have is with crew duty day. We need to go augmented to make it, and we're absolutely bingo extra pilots."

"Except you," the scheduler concluded hopefully.

The wreckage came to rest abruptly to the right of the active runway. Its wings described an "L" shape, with the crushed remains of the forward fuselage between them. Even as the fire trucks raced toward the devastation, the first explosion ripped through the quiet evening. Mercifully, the crew and passengers still trapped inside never heard it.

"You just need me to be a third body, then?" Ray asked wearily.

"Absolutely. Just crawl into the bunk and go to sleep as soon as they level off. If your body temperature hangs around 98.6°, we'll be legal. Whattaya say?"

The decision was almost too easy to make. Ray had been around the system long enough to know how rarely the augmenting pilot was ever called upon to *do* anything . . . with luck, he could make Germany by

midday, and be in Frankfurt by evening. A quick look at the new place to make Yvonne happy, maybe a chance to have an informal talk with the new boss . . . yeah, why not?

The firemen suffered two near-fatal casualties trying to fight their way into the gaping hole behind the remains of the wings. Forced back by the sheer intensity of the fuel-fed inferno, they could only watch helplessly as the once-proud aircraft reduced itself to molten slag. The powerful fire suppressant cannons continued to bombard the blazing fuselage, but with little effect.

"Okay, I'm your boy," Ray agreed, gesturing at the wine glass in front of him. "I guess I'm within ten hours of show time, so I'll knock this off now."

"Thanks, Ray," the scheduler said gratefully. "I know it's cutting it a little fine, and I know you don't like to work like this . . . ."

"Forget it, Ed. It'll work out pretty well for me too. I think I'm going to go grab a little rest, though. When's the briefing?"

"Ten-thirty tonight, but I'll let the other guys know you may show a little late. If you can, just give them a call around then and find out when they want you to show."

The assistant fire chief, having confirmed that his injured firefighters were being cared for, turned back toward the crash scene. He regarded it silently. Papers and bits of fabric, borne aloft by the heat of the flames, began to float lazily downwind. The chief climbed into his truck and followed them to the nearby tree line, where they were starting small brush fires in the tinder-dry grass.

The rest of the day went a lot faster than Ray expected. His realtor called with some last-minute proposed changes to the terms of the house sale, and he had to dig a flight suit out of a sealed-up box (after figuring out which of nine boxes it was in). By the time seven o'clock rolled around, he knew he wouldn't be getting very much sleep before the flight.

A quick, routine brief by the AC filled in most of the details of the sortie. Except for the destination and duration, it was "ops normal" all the way. Climbout went smoothly, and Ray climbed into the bunk for a welcomed nap. The heater wasn't working very well, as usual, and it seemed like only a few minutes had gone by when the engineer was shaking him.

"The major wants to talk to you for a minute, sir. I'm a little worried about him, he looks kind of green."

Ray climbed down wearily and moved forward. One look at the AC told him that he'd better wake up fast and take charge—the major was obviously in no shape to stay at the controls.

"Okay, crew," Ray said with a cocky grin, rubbing sleep out of his eyes and sliding into the left seat, *"where the heck are we?"*

The fire chief stopped his yellow pickup at the edge of the woods. He climbed down, went to the back, and unrolled the hose. As he sprayed the chemical stream on the crackling brush, he paused briefly to stamp one booted foot on a burning paper. In the dark, he never saw its pale blue background, or its gold stripe.

After graduating from the Air Force Academy in 1978, Capt. Thomas A. Farrier completed Undergraduate Helicopter Training at Fort Rucker, Alabama. Captain Farrier was then assigned to the 703 TASS, Shaw AFB, South Carolina where he flew H-3 helicopters. Following this, he was assigned as Chief of Aircrew Standardization/Evaluation at Det 14, 67 ARRS, Keflavik NS, Iceland. In March 1985, he was transferred to the 1 HS, Andrews AFB, Maryland. Presently Captain Farrier is assigned as a wing flight safety officer at the 89 MAW, Andrews AFB, Maryland.

Flying-Hour Milestones

10,000

Lt Col Lowery K. Bailey, 758 TAS
MSgt Esteven Jaramillo, 68 MAS
MSgt Michael L. Smith, 3 MAS

5,000

Col James H. Davis, 435 TAW
Col Walter Kross, 436 MAW/CC
Lt Col Norma J. Acosta, 73 AES
Lt Col William C. Herrick, 15 MAS
Lt Col Larry K. Kelley, 36 TAS
Lt Col Richard H. Lettan, Jr., 22 MAS
Lt Col Gene L. Ramsay, 144 TAS
Maj David C. Baird, 304 ARRS
Maj Robert V. Blanton, 730 MAS
Maj John G. Bush, 76 MAS
Maj Charles D. Ethredge, 707 MAS
Maj Richard F. Ferguson, 68 MAS
Maj Delbert D. Harris, Det 2, 1400 MAS
Maj Michael T. Hennessy, 36 TAS
Maj Kenneth C. Johnson, Jr., 301 ARRS
Maj Ronald L. Kallock, 301 MAS
Maj Michael L. Leinen, 772 TAS
Maj Peter P. Zapaolo, Jr., 1 MAS
Capt Russel S. Miller, 18 MAS
Capt Joseph B. Pawlikowski, 180 TAS
Capt Edward D. Perry, 772 TAS
Capt John E. Tamkun, 18 MAS
SMSgt Michael W. Ferguson, 772 TAS
SMSgt Charles B. Holzer, 18 MAS
SMSgt Phillip Lucero, 86 MAS
SMSgt Thomas R. Swenson, 36 TAS
SMSgt John C. Tower, 176 TAG
MSgt Quentin G. Anderson, 772 TAS
MSgt Joseph B. Brown, 22 MAS
MSgt Ivan G. Capetillo, 18 MAS
MSgt Raymond E. Cook, 86 MAS
MSgt Thomas L. Gillespie, 86 MAS
MSgt David V. Huson, 758 TAS
MSgt Steven P. Jones, 75 MAS
MSgt Fred D. Martin, 37 TAS
MSgt John R. Stubblefield, 22 MAS
MSgt James W. Warren, 37 TAS
TSgt Charles W. Beaver, 772 TAS
TSgt Cedric C. Early, 18 MAS
TSgt Duane Edwards, 18 MAS
TSgt Wayne C. Garrett, 15 MAS
TSgt Paul J. Goedert, 37 TAS
TSgt Edwin G. Petra, 73 AES
TSgt Ulysses J. Sims, 15 MAS
TSgt William A. Tafoya, 36 TAS
SSgt Kenneth E. Bowen, Jr., 36 TAS
SSgt Jerry L. Caldwell, 36 TAS
SSgt Douglas M. Dean, 86 MAS
SSgt Javier Tanguma, 15 MAS

2,500

Maj John E. Baczuk, Jr., 304 ARRS
Maj Micheal W. Everitt, 304 ARRS
Maj Charles W. Griffin, Det 5, 39 ARRS
Maj Richard A. Kraemer, 301 ARRS
Maj Dwayne D. Troxel, 304 ARRS
Maj Robert J. Weed, 304 ARRS
Capt William K. Curtis, HQ MAC/IG
Capt Guy W. Dempsey, 31 ARRS
Capt Van J. Leffler, 301 ARRS
SMSgt Robert F. DeYoung, 301 ARRS
MSgt Lawance H. Williams, Det 5, 40 ARRS

Ranks and units are those at time of award. See MACR 900-3 for details on how to apply for your own milestone award.

TMF Instrument Quiz

Okay folks, time for another *TMF* mind-boggling instrument flight quiz. "Big deal," did we hear you say? Well, we'll soon find out! Courtesy of the wonders of modern word processing (and using a little imagination), we are transporting you to the skies over beautiful Lake Tahoe, California. The time is 2300 local (that's 11 PM for all of you Strat Airlifters and when Mickey's little hand is on the 11 for all you '130 guys). Believe it or not, you're flying your very own U.S. Air Force, fixed-wing type, category B aircraft. You would very much like to land at Lake Tahoe to crewrest, maybe try your hand at the gaming tables tonight, and perhaps take advantage of the ski slopes tomorrow. So close and yet so far! Let's see if you can get your aircraft on the deck safely. Ready? Here we go.

1. Let's start with something simple. What does the LDA in LDA/DME-1 RWY 18 stand for and may you fly this approach in your aircraft equipped with DME, VOR, and ILS equipment?

a. LDA stands for Little Dinky Airport and sure, why not.

b. LDA stands for Localizer Distance Aid and you better not try this one because your aircraft isn't equipped with special LDA avionics.

c. LDA stands for Last Ditch Attempt and sure, you may as well try.

d. LDA means Localizer Type Directional Aid and you can shoot this one, no sweat.

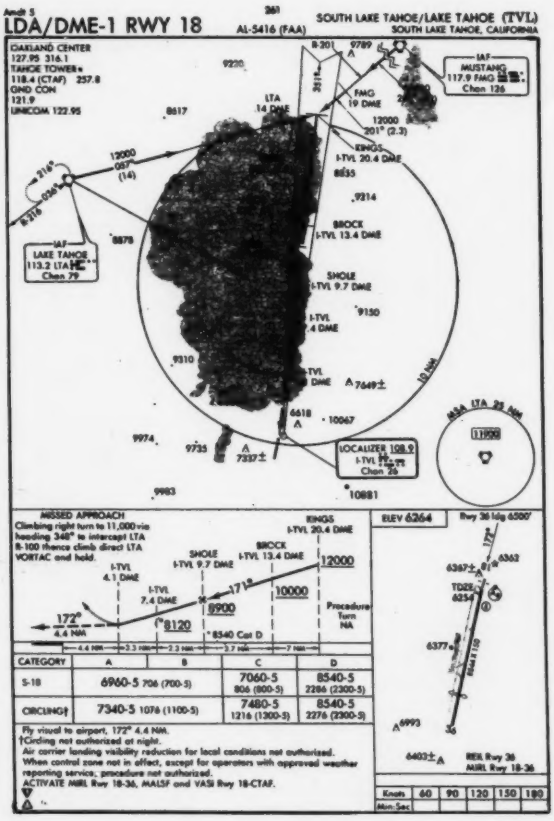
2. Let's assume we *can* fly this approach. You are approaching the Lake Tahoe VORTAC (your clearance limit) via the 350° radial at 13,000 feet assigned, in radar contact. You've been cleared for the approach. You _____.

a. may proceed direct to intercept the 057° radial without crossing over LTA

b. may descend to 12,000 feet provided you are on course inbound to LTA

c. must fly direct to LTA

d. tell the controller you're unable to comply



3. All right, you're still inbound to LTA, cleared for the approach and in radar contact. You determine that normal lead points won't hack the turn to the 057° radial. You need to use some maneuvering airspace. Must you request it?

a. No. When the controller cleared you for the approach he took care of that clearance for you.

b. You bet. Clearance for the approach doesn't include clearance for maneuvering airspace.

4. So far, so good. Maybe you'll make it to the tables yet! Now you've crossed LTA and turned outbound, cleared for the approach. To what altitude, and at what time, may you descend?

a. 14,000 ft; any time you want.
b. 11,000 ft; now!
c. 12,000 ft; once you're on course.
d. 12,000 ft; once you're on a parallel or intercept heading to the R-057 course.

5. You are now on the 057° radial from LTA to KINGS intersection. What is the minimum safe altitude for that airspace?
a. 12,000.
b. 10,000.
c. 11,900.
d. 12,100.

6. The sawtoothed, double line depicted on the Mustang 201° radial means _____.
a. doubtful accuracy
b. distance not to scale
c. route unusable
d. radio reception unreliable

7. Distance Measuring Equipment (DME) isn't *required* to fly this approach.
a. True.
b. False.

8. What is the distance between Mustang VORTAC and KINGS intersection?
a. 21.3 nm
b. 19 nm
c. 20.1 nm
d. 20 nm

Okay, you can almost feel the skis on your feet and the snow pellets rebounding off your face. But before you get *too* carried away, shake that cornstarch off your mucklucks and take a look at a few more questions.

9. What minimum weather would *have* to be present in order to fly the straight-in approach?
a. 700 ft ceiling; 5 miles visibility.
b. 700 ft ceiling.
c. 5 miles visibility.
d. 1,000 ft ceiling; 3 miles visibility.

10. Reported winds at Lake Tahoe are out of the north at 25 knots (remember, you're in a fixed wing aircraft). What do you think you should do?
a. Better fly the circling approach.
b. Press on! You can handle a 25-knot tail wind.
c. Sorry about this, but you better kiss South Lake Tahoe goodbye and divert to your alternate.

11. When may you descend out of 6,960 feet (the MDA for this approach)?
a. When you're on course inbound.
b. When you establish sufficient visual reference with the runway.
c. When the aircraft is in a position to execute a safe landing.
d. When the conditions in both b and c above are met.
e. *All* of the above *must* be met before you can descend.

12. All right, one last question and we'll let you go try and double your per diem advance downtown. Suppose you're flying into this airport under VFR and notice the MIRL are not on. What could you do in order to shed a little light on your subject (the landing)?
a. Call the pit boss at *Harvey's* inform him that you're a high roller, and ask him to run down to the airport and turn them on.
b. Dial in 257.8 on the UHF and key the mike 3 times in 5 seconds.
c. Dial in 118.4 on the trusty old VHF radio and key the mike 5 times in 5 seconds.

Got em all correct, huh? Good. Enjoy Lake Tahoe. If not, we suggest you spend some time reacquainting yourself with the rules. "Yeah," you say, "but I *always* get *vectors* to final!" Well, it's obvious you haven't flown into Lake Tahoe recently. Yo eleven!

The Answers

1. d; IAP legend
2. c; AFM 51-37 para 6-13b
3. b; AFM 51-37 para 6-13b
4. d; AFM 51-37 para 6-13d(1)
5. c; IAP MSA Chart
6. b; IAP legend
7. b; IAP
8. a; IAP
9. c; AFR 60-16
10. c; IAP note
11. d; AFM 51-37 para 6-16a(2)(f)
12. c; IAP legend/note on IAP

COMBATING FATIGUE

by Capt. Donald A. Deisel
USAF Hospital, Mather AFB, California

We all know by now what nasty things fatigue does to performance. A more critical topic could be, "What can I do to combat it?" There are a number of tricks to beating fatigue and dealing with circadian desynchronosis, alias "jet lag."

First, look at what happens during sleep. It's well established—sleep patterns follow a circadian rhythm. This cycle appears to be geared to the same internal biological clock which governs cycles in body temperature, metabolic rate, heart rate, and hormone secretions. Some research has been directed toward the effects of disrupting the rhythm of sleep.

Examination of sleep stages reveals one specific stage is of particular importance—the stage during which rapid eye movement (REM) appears towards the end of the sleep cycle. REM seems to be an essential stage to achieving a complete, restful sleep and occupies about 25 percent of the total sleep time.

Several factors may reduce or eliminate the REM portion, resulting in a less than adequate quality of rest. Most obvious would be early termination of sleep. Another might be discontinuous sleep due to environmental interruptions such as light or noise. Perhaps less obvious would be the effects of drugs, alcohol, poor nutrition, and physiological factors. These stresses alone may result in non-restful sleep.

Alcohol tends to repress REM sleep, rendering the sleep less restorative to the individual. This could raise some doubt as to the value of alcohol as a sleep aid. In addition, the "hangover" tends to have residual effects on performance after sleep. Barbiturates show a similar effect on REM sleep and impair performance the day following use. Other drugs used to induce sleep, such as Valium and Dalmane, may impair memory and reduce performance of skill tasks well into the next day.

Additional stressors, such as nutrient deprivation resulting from incorrect dieting and dehydration, could have an adverse effect on central nervous system function. The results could be impatience, sleepiness, and impaired memory. The effects are

magnified when combined with sleep deprivation. Since alcohol can present a dehydration problem, it may also be considered in this context.

Here's something you can try instead of shooters, beer, or a glass of wine to help you fall asleep. Remember the old glass of warm milk trick? Well, the United States Naval Health Research Center took a closer look at this old remedy and found that trytophan, an amino acid found in dairy products, actually does help people fall asleep. This is particularly true when consumed with high carbohydrate food. How often have you felt drowsy just after eating a nice, big bowl of ice cream?

On the other hand, you may want to avoid such foods when you want to stay awake and alert. A high protein, low carbohydrate meal of moderate proportions would allow you to resist sleep better than a meal high in carbohydrates. Simple sugar foods are a definite no-no. Sure, that candy bar may pick you up quickly, but a very tired, sleepy period will soon follow.

Don't stuff yourself with food when you want to remain alert and awake. How many people go to the living room for that irresistible nap following Thanksgiving dinner? That's because blood concentrates in the gut to digest those massive quantities you've just consumed, leaving much less blood for your brain.

Now, what about that cup of coffee you're sipping? We all know how beneficial coffee is in perking you up and keeping you alert. But, once you get past the fourth or fifth cup, the beneficial effects of caffeine may be lost and reaction time increases. It takes about three and one-half hours for your body to rid itself of half of the caffeine it has absorbed. Excess caffeine can induce insomnia, decrease total sleep, and reduce REM sleep. Since coffee is a diuretic, it can send you back and forth to the latrine just as alcohol does. These are critical factors to consider if quality sleep is as important as sack time.

One of the most difficult physiological problems for a MAC crew to deal with is jet lag. There are numerous ways to cope with this mission-imposed stress. One blatantly obvious, but often neglected, suggestion is to start the trip well-rested. Try to move around the cabin during the flight, when you have a chance, to circulate the blood that has settled in the seat with you (the old stagnant hypoxia concept).

If you're traveling in a westerly direction you can expect to adjust more quickly to the time zone changes than if flying east. It seems that the body prefers a 25½-hour schedule, but tends to adjust to a 24-hour schedule due to the environmental cues it receives. Therefore, you will adjust more quickly when heading west since the day is lengthened. Flying east compresses the day, making adjustment more difficult. Research indicates that those who engage in outdoor activities adjust more quickly than those who remain indoors. This is possibly due to the environmental cues the body receives when inside and outside.

The mission does not always permit time for complete physiological adjustment to one location before you're off on the next leg. Under these circumstances one can expect some cumulative fatigue, a problem flight crews must be prepared to deal with. Crew members should ask themselves a few questions before the mission. Am I doing all I can to enhance my tolerance to fatigue? Are my so-called "morale building" activities actually detracting from the quality of my crew rest? Am I in adequate physical condition to endure the physiological stress of long-term fatigue? Those in supervisory roles should ask themselves how well they know their people. They should look for and react to the warning signs of fatigue if they observe it in their subordinates.

Chronic fatigue and sleep deprivation may manifest itself in the crew member as increased irritability, decreased attention span, increased susceptibility to error, decreased recent memory, delayed decision capability, and increased reaction time. The implications of such performance decrements are obvious, particularly if one considers that often the sleep-deprived crewmember is satisfied with a much less than adequate performance.

Treatment of chronic fatigue includes observation of crew duty and rest regulations, perhaps some leave time, adequate recreation, and attention to morale factors. Fatigue may be induced by a multitude of factors, so a cure-all solution does not exist. Throw everything you can at the problem. You *can* combat fatigue.

Premission Planning

Forewarned is forearmed.

The more I think about it, Mac, the more terrifying it becomes. If the nav had waited just five seconds longer to call that abandoned lookout tower . . . ."

"That's what the crew concept is all about, Jack. It also makes a pretty good argument for using the CHUM."

"I've noticed you always make a point of comparing your chart with the nav's, is that why?"

"Yeah. I'm not infallible, you know. It's always a good idea to crosscheck the updates you make on the chart with someone else's. After all, it doesn't do much good to update your chart, if you do it wrong—an easy mistake."

"I'll say. Those UTCs aren't my favorite things to work with."

"In addition, comparing your map with another crewmember's automatically sets up a discussion not only of the *existance* of additions to the charts, but highlights those man-made objects which might be a factor on the routes you fly, especially if you plan any fluid trail."

"I guess I fell victim to complacency. Those obstacles noted in the CHUM are rarely anywhere near our routes, and besides, I always figured we plan our routes around those kinds of obstacles. I've also flown these same routes over and over, so I naturally figured there just weren't any surprises left. Sure didn't expect any abrupt maneuvering like that. By the way, I trust your shoulder isn't too painful?"

"I'll be fine. We certainly were lucky we'd already made the drop. That kind of maneuvering with 38 jumpers and their backpacks in the back has a high potential for injury. It reminds me of a particularly harrowing episode in my lead upgrade training several moons ago. I was a relatively young copilot, but that didn't prevent me from paying a little more attention than I needed to, to the duties of the aircraft commander, especially at the expense of my own responsibilities. The consequences of my misguided preflight attention wouldn't become clear until later."

"Hang on, Mac. Let me get my student in here. I want to debrief this incident while it's fresh in our minds, and he might also benefit from your earlier experience."

"Great. I'll just grab a cup of coffee and meet you and Steve in the tactics room."

After they'd gathered in the tactics room, Steve asked, "So, I understand you have a story which might convince me to stay with this flight stuff even after tonight, eh?".

"Right you are, Steve. It happened back a few years. I was upgrading to Lead and that evening we were scheduled for a five-hour trainer, much like tonight. The routes were familiar; in fact, they were right in the flimsy, and we planned to fly them as published and as they appeared in the OPORD."

"Sounds like deja vu to me."

"Yeah, scary isn't it? As I recall, with one exception, the aircraft was in great shape."

"No engines, right?"

"No, Steve. The only problem with our Herk was the doppler wasn't working very well. Our first planned route was to AIR DZ. We were single ship, but simulating 2d

element lead for SKE purposes. We flew the route smoothly, practicing a number of techniques en route."

"You mean like fluid trail?"

"In a fashion. But instead of simulating a leader, we merely assumed a hostile environment and attempted to act as we would in a real contingency—unpredictable. As we flew along the route, we became more and more convinced we were not just proficient, we were great! The airdrop went well, 40 troops out, and 40 left aboard for our next route. That's when things started getting a little more exciting."

"Were you coming back to the same drop zone?"

"Yes, and flying the same route, which made things even worse."

"That sounds pretty simple to me, a repeat route is always easier to fly."

"That's exactly what we thought, Steve. And it helped set us up. On the third leg of the mission, we were about 1½ miles to the left of course, and had just turned back to the right to cross over. We skirted around the left of a small bluff, then climbed to pass a ridgeline. There was a small draw which angled away from us to the left. To keep our profile low, the AC accelerated as we climbed, then cut power and entered a left bank just before we cleared the ridge, so our momentum would carry us over, but we wouldn't overshoot too badly, thus highlighting ourselves against the sky. No sooner had we cleared the ridge than I found myself pinned to my seat as the aircraft commander abruptly applied max power and executed a sharp right bank and 2G pullup. I watched helplessly as the newly constructed ranger firewatch tower passed beneath our left wing a mere 50 feet. I'm certain it would have impacted the wing between numbers 1 and 2 engines if he hadn't taken evasive action."

"Evasive action makes it sounds a lot like dodging parked cars," Jack interjected.

"You're absolutely right, Jack. And it highlights the stupidity of the incident. Here we are, professionals, flying a route designed by professionals. We knew the route, we knew the procedures. How could this have happened?"

"Sounds like the infamous *'they'* built a watch tower when you weren't looking and didn't tell anybody."

"Almost, Jack, but that explanation would lay the fault outside our unit, and away from our crew—not true."

"You're saying you were responsible for knowing about a newly constructed tower which wasn't even near your planned course?"

"Yes, Steve, we were. That tower was built, as you suggested, after the route was designed; naturally that means it wasn't considered in any of the route or altitude criterion. But far from being too recent an event to be resolved, our tactics folks had noted the tower construction, even placing a notice at command post for the benefit of transient crews, identifying the location and height of the tower. Additionally, our command post folks were briefing the ACs on the hazard, though none of us could remember the briefing, in retrospect."

"So none of you knew the tower was there. Not what I consider an inexcusable mistake, Mac."

"Td have to agree with Steve, Mac. Sounds like you did the best you could with the information you had available."

"There's more, guys. We *had* the information about the tower, we just didn't use it. You see, the navigator had constructed his chart the night before. He even used the Chart Updating Manual to update his JOG. Unfortunately, he misplotted the tower by about 1½ nm left."

"So that's why he didn't consider the tower as much of a hazard to flight."

"Right again, Steve. I had also constructed a chart. I made mine the morning of the flight, using a bad technique—I copied a previous chart. While I had the

tower on my chart, I, too, misplotted it. My error misplaced the tower a mile to the right of its real location."

"I don't know about you, Jack, but it seems to me you didn't do anything all that wrong. After all, the CHUM isn't that easy to use, and certainly there are more things to worry about than just your chart. I think it's remarkable you had both plotted it."

"That is exactly the error we made, Steve. We didn't do any *real* premission planning. What we did was premission preparation. What I mean is we just went through the motions. It was a routine mission, and the rules said draw a chart, so we did. The navigator and I both plotted the tower on our chart with the same care and concern we used in labeling the reverse side with the edition number of the JOG. It was valuable information, but we weren't using it at all. We may as well have never prepared a chart and just flew from the flimsy."

"I'm not sure I buy that analogy, Mac. After all, you can't say you weren't prepared at all. You both had charts for the routes you were on, and you were familiar with the routes. You also had the assurances of the flimsy and the OPORD that you were safe."

"That's yet another of the same erroneous assumptions we made that day. Because the route was in the flimsy and the OPORD, we figured the altitudes were safe. Turns out the day altitude would keep us legal for ATC requirements, sensitive areas, and was a minimum altitude to satisfy user requirements. The altitude didn't guarantee obstacle clearance."

"That doesn't sound very reassuring. It's as though we can't take anything for granted. If we adopt that policy, we'll spend so much time cross-checking things that ought to be certain, we won't be able to get the mission off the ground!"

"I disagree. While it's certainly a lot healthier to be skeptical about everything, I'm not suggesting you replot all your turn points for every mission. But when it comes to altitudes and obstacle clearances, we could be easily faulted for not rechecking the route altitude and, for that matter, the ESA. It also showed me I need to work with other crewmembers just as much before the flight as during the mission. If the nav or I had looked at each other's chart with a bit of the sarcastic eye we use when checking to see if the copilot forgot to turn off the taxi lights during the engine shutdown checklist, or to see if the nav turned off the radome anti-ice before calling the climb checks complete, we'd have probably caught the mistake."

"And you think that would have made a difference?"

"It would have highlighted the tower's existence for one thing. And knowing how neither one of us would likely admit to being in error without rechecking the CHUM, I'd have to say we *would* have discovered the tower was a real player for our route, which probably would have pointed out the altitude error."

"The only question I still have, Mac, is why nobody saw the tower until it required drastic action to avoid."

"Well, I know I was map reading. It sounds funny that I didn't see a significant terrain feature because I was looking at other terrain features, but that's what happened. I was concentrating on a lake off to our right, checking our offset distance with our plotted chart. The nav said he was pulling out his run in chart and refiguring the CARP, when the aircraft suddenly pitched up. He never did see the tower."

"Well, Steve, as Mac pointed out, we aren't the only ones to have made this error. I know I'll certainly be more dedicated to my premission planning than I ever was before. In a way, you're lucky to learn this lesson this early in your career."

"I guess we're pretty lucky just to be here discussing it, Jack. Thanks for the advice on the CHUM, Mac. I think I might even pass this along to some of the guys."

"Good idea, Steve. I recommend you and Jack relay tonight's close encounter to the entire squadron. Hopefully your mistakes, and more importantly, what you've learned from them will keep somebody else from repeating this scenario."

Self-imposed stress can turn night flight into . . . .

Night Fright

by Capt. Michael J. Iltis
Associate Editor

The cooler days of November are upon us. The leaves have already changed color and soon, the leafless skeletons of deciduous trees will be all that will remain to remind us of the long days of summer. Now that daylight saving time has "fallen back" to standard time, those who fly in the northern hemisphere are likely to find themselves aviating more often at night. With this in mind, it's appropriate to refresh our memories regarding the importance of night vision.

"All right," you say, "why is this guy subjecting me to this tirade about night vision? After all, I passed my annual flight physical and shouldn't have any problem with night vision." The truth is, however, even if you can read line *10a* on the eye chart, the old peepers can still fail to measure up when the lights are turned down unless you treat your eyes right. To do this, we must first know something about the physiology of night vision and the reduction in night visual acuity caused by self-imposed stressors.

Physiology of Vision

Our propensity to operate aircraft safely depends on our ability to process information supplied to the brain through our senses. Needless to say, sight is the primary source of sensory input. However, the "quality" of visual perceptions is inherently diminished in darkness.

The eye is made up of two basic parts: the cornea-lens-iris combination (CLI) and the retina. The CLI acts as a filter to control and focus the amount of light that enters the eye, while the retina serves as a thin, light-sensitive membrane where visual images are formed. The visual center of the retina is called the fovea centralis. This portion of the retina contains only cones. Cones are light receptors that are color sensitive and provide the excellent vision experienced during daylight. However, as light is reduced, so too is the effectiveness of this portion of the eye. In fact, the fovea centralis becomes so ineffective in pitch-black conditions that it actually creates a 5° to 10° blind spot in the center of our field of vision. Therefore, at night, the portion of the eye that surrounds the fovea centralis becomes more important. This portion of the eye contains a mixture of cones and rods. Rods are not color sensitive and perceive movement and form in shades of gray. Rods are the primary source of night vision. They are about 1,000 times more light-sensitive than cones. Aside from the fact rods don't detect color, the other major disadvantage they have is they bleach out once exposed to flashes of light. This can cause temporary blindness.

Self-Imposed Stress

During annual physicals, the flight surgeon determines if our eyes meet clinical standards required for night flight. What he can't measure, however, is the reduction of visual acuity we impose on ourselves. A breakdown of night vision is probably caused by one of several self-imposed stressors: smoking, alcohol, fatigue, nutrition, or physical conditioning.

- *Smoking.* Smoking affects night vision by increasing the amount of carbon monoxide in the blood. The saturation of hemoglobin with carbon monoxide reduces the effectiveness of the rods and cones in much the same way as does hypoxia. In fact, this condition is often referred to as histotoxic hypoxia. Smoking about a pack of cigarettes the day before a night flight reduces night visual acuity by nearly 20 percent.

Night visual acuity is also inversely proportional to altitude changes. This relationship is particularly noticeable in those people who smoke. The best example of this reduction is the night visual acuity demonstration performed in the altitude

chamber. Remember when the physiological technician had you look at the color chart *without* your oxygen mask on? If so, you should also remember how vividly the colors came into view as you replaced your mask and breathed 100 percent oxygen. This same principle applies to the effect of carbon monoxide introduced into the blood by cigarette smoke. Simply stated, smokers wander around about 4,000 feet higher than nonsmokers (as far as blood oxygenation is concerned). "No big deal," you say? Consider this. Cabin pressure in most multi-engine aircraft is automatically maintained at about 8,000 feet. This puts the smoker at an equivalent altitude of 12,000 feet! These conditions definitely affect night vision.

- *Alcohol.* The effects of alcohol on night vision are the same as its effects on day vision—only in spades. In addition to reducing the oxygenation of the blood, alcohol also acts as a depressant, slowing visual recognition times. Though few would attempt to fly drunk, what may be more common (and equally dangerous) is flying with a hangover. Hangovers promote lethargy and slow reaction time. They're also dangerous because the effects of hangovers are often disregarded by crewmembers.
- *Fatigue.* Fatigue also slows reaction time and fixation becomes a problem—particularly at night. Crewmembers may not recognize that they're suffering from fatigue until it's too late. Stimulants such as caffeine only mask the effects of fatigue (see related article pg. 14).

Fatigue also increases potential for visual illusions. Though visual illusions can occur at any time, night offers the proper setting for a few which occur frequently. For example, earth and sky may appear to blend at night, particularly during flight over populated areas where the number and brightness of lights mix perfectly with starlight. Visual autokinesis is another visual illusion which occurs at night. This phenomenon happens when a person stares at a stationary light—a bright star, for example—for a long time. Suddenly the stationary light begins to "move" through the sky. The ramifications of this are obvious, particularly viewed in the context of a night formation flight.

- *Nutrition and Physical Conditioning.*

We can do little to enhance our night vision through nutrition, but if we don't eat sensibly, we can do much to degrade it. Sounds contradictory, doesn't it? However, vitamin A is essential for good night vision. If we deplete vitamin A stores, we reduce visual acuity. On the other hand, increasing the intake of vitamin A above that normally found in our daily diet does little to help our night vision and sometimes has the opposite effect. The key lies in a balanced, sensible diet. Normal consumption of foods such as eggs, liver, carrots, red meats, and green vegetables will provide adequate vitamin A.

Likewise, your night vision is enhanced if you keep fit. Increased lung capacity and oxygen content of the blood are just two of the many benefits of a regular physical fitness program.

What Can I Do?

There is little we can do, ourselves, to alter physical deficiencies of the eyes. However, eating a balanced diet, avoiding self-imposed stress, and being alert for visual illusions will help us optimize our night vision. Additionally, there are a few tips to keep in mind prior to and during flight which will also help.

First, if possible, allow your eyes the opportunity to adapt to a dark environment before each flight. Remember, night vision is mostly rod-dependent and rods are extremely light-sensitive. Bright light "washes out" or shuts down the rods. When this happens the rods must be given time to readjust (approximately 20 - 30 minutes under minimal lighting conditions).

Next, when scanning during flight, start at the farthest distance in the field of view and work your way inward, toward your aircraft. Scan right to left, stopping to momentarily fixate each 30 degrees. It's important to keep the eyes moving to avoid focusing with central vision (recall the discussion on the night vision blind spot?).

Finally, recognize the limitations of night vision and deal with them accordingly. Once you're aware that distinct, cone-intensive vision is almost impossible and that self-imposed stress reduces night vision, then in a very real sense, you've already improved your night vision.

Oh Say Can You See?

Winter brings out the worst!

by Maj. Thomas C. Weinzierl
Supervising Editor

Winter is once again upon us and of all the hazards aviators face this time of year, none is so pervasive as restricted visibility. A quick review of some of the more common restrictions to visibility, and the weather conditions that produce them, will (hopefully) better prepare us to face another season of arctic cold and marginal weather.

Fog

Plain old fog is one of the most common and persistent weather hazards aviators face every winter. Since fog occurs at the surface, it presents the greatest hazard during the two most critical phases of flight, landing and takeoff.

Fog is a cloud composed of water droplets or ice crystals, depending on the temperature, which lies on the surface of the earth. Since fog normally forms in very stable air, there is little or no collision between the extremely small droplets or ice crystals. Therefore, a large number of these suspended particles must be present before visibility is

greatly reduced. However, fog dense enough to restrict visibility to a mile or less can form quite rapidly—a gradual thickening does not always occur. An example is the sudden increase in fog density that often occurs shortly after sunrise.

Ideal atmospheric conditions for fog formation are: high relative humidity (small temperature-dew point spread), an abundance of condensation nuclei, light surface wind, and some cooling process to start condensation. Fog is, therefore, more prevalent in coastal areas where moisture is abundant. Even when the relative humidity is less than 100 percent, fog is persistent in industrial areas, where products of combustion provide a high concentration of condensation nuclei. Fog occurs more frequently in the colder months, but the season and frequency of occurrence vary from one area to another.

Fog may form by cooling the air to its dew point or by adding moisture to the air near the ground. Names of various types of fog are based upon the way they are formed. In many cases, more than one process is operating at the same time.

Radiation Fog

More commonly called "ground fog," radiation fog is the result of ground cooling on clear, calm nights. The ground cools the air to the dew point temperature. It's restricted to land areas because water areas do not have much daily variation in temperature. It forms almost exclusively at night or in the early morning and usually disappears within a few hours after sunrise. Ground fog favors flat land areas.

Light wind, up to about five knots, produces a slight mixing of the air, which tends to deepen the fog by spreading the cooling through a deeper layer. Radiation fog is usually very shallow where there is no wind flow.

Advection Fog

This type of fog forms when moist air moves over colder ground or water. Very common along coastal areas, it's often called "sea fog" when occurring at sea. It can also form concurrently with radiation fog.

Advection fog deepens as the wind speed increases, up to about 15 knots. Stronger winds lift the fog into a layer of low stratus.

The west coast of the U.S. is quite vulnerable to advection fog. It frequently forms offshore, largely as a result of very cold water from the ocean depths rising to the surface. The fog is then carried inland by the wind.

Advection fog over the southeastern U.S. and along the Gulf Coast results from moist tropical air moving over cold ground. It is, therefore, more common in winter than summer.

Upslope Fog

This fog forms as a result of moist, stable air being cooled by forced ascension up a sloping land surface. An upslope wind is necessary not only for its formation but also for its continued existence. If the wind becomes strong, the fog lifts and becomes low stratus clouds.

Upslope fog is common over the eastern slopes of the Rockies and somewhat less frequent east of the Appalachians.

Steam Fog

The movement of cold air over much warmer water causes intense evaporation. This usually adds enough water vapor to the cold air to saturate it, forming steam fog. Steam fog rises from the water surface like smoke, and it's sometimes referred to as "sea smoke."

Since steam fog, unlike advection fog, forms over a warm surface, heating from

below tends to make the air unstable. Therefore, turbulence and icing often occur in this type of fog.

In autumn, steam fog is sometimes observed over rivers and lakes in the middle latitudes. Water surfaces cool much more slowly than land surfaces this time of year and are still relatively warm compared to an invading cold air mass. It occurs frequently in the winter over open bodies of water in polar regions.

Precipitation-induced Fog

The addition of moisture to the air through evaporation of rain or drizzle causes what is known as precipitation-induced fog. Evaporation can occur when precipitation is falling through the air and after it reaches the ground. Although it's most frequently associated with warm fronts, it may sometimes form with cold and stationary fronts. Other factors being favorable, it can occur with nonfrontal as well as frontal precipitation. Precipitation-induced fog usually forms rapidly when associated with a front and covers a large area, especially when it accompanies warm-frontal precipitation.

Ice Fog

"Ice fog" forms in moist air during extremely cold, calm conditions. The tiny ice crystals composing it are often called needles or spicules. Very bright reflections or shimmering lights result when the sun shines on these suspended particles. Effective visibility is largely dependent upon whether or not you are looking toward the sun. Ice fog is not uncommon as far south as the northern plains states but it occurs mostly in the Arctic.

Sudden ice fog formation over a wide area may be triggered by local sources of water vapor, condensation nuclei, or turbulence, such as aircraft, automobiles, factories, laundries, animal herds, etc. When the wind is very light and the temperature is -30°F or lower, ice fog often forms almost instantaneously in the exhaust gases of automobiles and aircraft. It may last only a few minutes but can also persist for several days.

Low Stratus Clouds

Stratus clouds, like fog, are composed of extremely small water droplets or ice crystals suspended in the air. The main distinction from fog is that stratus is a layer above the ground and does not reduce the horizontal visibility at the surface below it. An observer on a mountain, enveloped in the layer, would call it fog, while one farther down the slope would call it stratus.

Stratus and fog frequently exist together. A cross-section of such a condition might appear as a layer of suspended water droplets extending from the ground to some height—perhaps several hundred feet or more—suddenly becoming denser as you enter the cloud base. Because of the reduction in upward visibility, the observer on the ground recognizes the condition as stratus. There is no firm distinction between stratus and fog other than height above the ground. In the vertical, it's a sudden transition from a less dense fog to a fog that gives the effect of a cloud.

Blowing Obstructions to Vision

Blowing snow can be as troublesome to a pilot as ground fog. Blowing snow is different than drifting snow, in that snow must be lifted by wind to a height of six feet or more before being classified as blowing snow.

Precipitation

Rain, drizzle, and snow are the forms of precipitation which most commonly present a ceiling and/or visibility problem.

Drizzle and snow usually restrict visibility to a greater degree than rain. Drizzle falls in stable air and, therefore, is usually accompanied by fog, haze, or smoke, frequently resulting in poor visibility. Of course, snow often reduces visibility to zero. Rain seldom reduces surface visibility below one mile, the exception occuring during brief, heavy showers.

Less daylight, lousy weather, and colder temperatures all combine to make winter flying more of a challenge than we need. However, in this business it comes with the territory. Keep a close eye on conditions at your departure base and destination. We don't actually use our departure or destination alternates very often but planning ahead to cover all bets is the only way to operate when Mother Nature plots to limit our options (and our vision).

(Editor's note: TMF readers familiar with NASA's Aviation Safety Reporting System (ASRS) should find the following information interesting. It seems the British developed a similar system in 1983 called the Confidential Human Factors Incident Report (CHIRP). We've captured some of those reports along with a list of human factors considerations used by British mishap investigators. They make revealing reading and may offer an insight into our own failings and foibles.)

1—If You Don't Mind, I'll Fly With Someone Else Next Time.

Two senior captains flying a medium sized passenger aircraft were returning to the UK.

It was the other captain's leg. He's an ex-fighter pilot and never forgets it. He's also a training captain, always criticizing our co-captain, and he always has superior equipment, watch, calculator, etc. On arrival I passed him the weather with the comment "You won't like it!" The weather was poor with strong crosswinds. At the marker we were badly placed and too high. I suggested "Full power for overshoot (go around)! He said, "Negative!" closed throttle, increased flaps, and continued with the landing. We hit first on port main wheel and wingtip, then I heard the crunch as the port engine struck the ground. He called for full power but I held the throttles tightly closed knowing the aircraft was structurally damaged. Further damage occurred before we came to a halt. My mistake was not being more forceful when it was quite obvious a safe landing was impossible. His subsequent attitude was that had I obeyed his instructions and given him full power he would have been able to take off again.

2—Go On, Have a Go. It'll Probably Be Okay.

Wide bodied aircraft: Weather—wind calm and fog. Venerable captain; experienced copilot and third pilot. On the first approach we flew a Cat I automatic approach, at DH of 220 feet the copilot initiated a go-around. During the go-around we saw the airfield lights so we came around for another approach. The second approach

was a replay of the first, as was the go-around.

As we entered holding to contemplate the situation, another aircraft landed! Someone suggested we should fly down 50 feet lower, but since this was not legal, it was ruled out. We then managed to delude ourselves into thinking that flying level at the DH of 220 feet was a legal and reasonable way to achieve our landing. To do this we disengaged the autopilot and the copilot flew a manual approach to 220 feet and leveled off. Within seconds the captain shouted "I have control" and the aircraft continued to fly level or only gently descend for several more seconds. From my position I studied the information on the flight instruments with a growing feeling of unease. Since the glideslope was full fly down and had been for some time, we had no way of knowing how far we were beyond the threshold. The brightness of the runway lights (or whatever) convinced me the captain could see and knew what he was doing. I called out our altitude off the radar altimeter the same time the equally concerned copilot called the speed and rate of descent. During the next few seconds, the cockpit filled with altitude, speed, and rate of descent calls.

We touched down heavily on the centerline. Heavy braking followed what can only be considered a "max performance" stop. We cleared the runway well down. The pregnant silence which followed reinforced our feelings that we'd been a party to an act of supreme folly and bravado and were lucky to escape with a few grey hairs and severely battered personal pride.

Later, over a beer, we discussed our folly. Why did we make the third approach? We had seen the lights twice—someone else had landed. Possibly the most reckless act of delusion was agreeing that flying level at 220 feet was reasonable. Ninety-five per cent of our problems stemmed from our lack of consideration of the ramifications of this deceptively simple solution.

1. By the time the captain took control the glidepath indicator was displaced full down.

2. The aircraft was trimmed (more or less) for level flight, not for an established rate of descent.

3. Training experience predisposed the captain to keep the aircraft on its trimmed flight path, and resist diving at the runway lights.

4. Why didn't someone call for a go-around? We were concentrating on giving the man who could "see" all the information we could and, for better or worse, letting him get on with the job.

3—Icing Again.

Shortly after landing at an enroute airport, it started to snow. During the 20-minute-turn-around, snow completely covered the ground. Inspection of the aircraft revealed only a very slight and light layer of what I considered to be dry snow on the wings and fuselage. Perhaps mindful of the scheduled departure time, I did not arrange, as I should have, to have the aircraft de-iced. I thought the airflow would clear the snow on takeoff. The ground temperature was plus 2° C. The takeoff was normal, and I trimmed the aircraft for climb to FL90. We entered clouds at 1,000 feet, which was also the freezing level. A slight buildup of ice developed on the wing's leading edge during climb which dispersed when I turned on the deicing system. However, on reaching assigned cruising level I could not lower the nose. Both elevator and trim were completely immobilized. No fore or aft movement of the control column or trim was possible. My immediate thought was to reduce power and move the passengers forward for nose down trim. After taking this action, I used brute force to try and muscle the controls free. This worked. I concluded that although the snow had blown clear from the clean surfaces this was not so for the hinges where the snow subsequently froze on the elevator linkages. Thank goodness I had a cabin attendant to handle movement of the passengers.

The following list of human factors considerations, devised by Peter Barden, Deputy Chief Inspector of Accidents of the British Department of Trade Accidents Investigation Branch, is used as a guide to study behavioral patterns in flight crew and related services personnel. Read it through and see if you agree with the analysis of the human factors involved in the first report at the beginning of this article. Then see if you can recall any of these factors in any of your mishaps or near mishaps.

Adapted from International Journal of Aviation Safety.

Analysis—Report #1:
A—1-2-3?-7-9-12-17
B—1-2-3-10
C—1-3-7
D—4-5-8-12
E—F—G—Factors Not Known

A. Factors Affecting Individual's Attitude

1. Uncooperative relationships between crewmembers.
2. Disparity of age/seniority affected crew interrelationship
3. Lacked confidence in other crewmember(s).
4. Relationship with employer adversely affected crewmember's performance.
5. Disliked or was fearful of airfield being used.
6. Disliked or was fearful of aircraft type being operated.
7. Overconfident.
8. Frustrated/irritated.
9. Overfamiliar with operation (long exposure to same routine).
10. Over tense.
11. Overanxious.
12. Self-centered (would not delegate duties to crew).
13. Did not understand underlying reason for drill/check/procedure.
14. No previous experience of precisely the same combination of circumstances.
15. Not adequately trained to perform maneuver/operation attempted.
16. Accustomed to perform maneuver or operation in a different way (with another company or on another type).
17. Under pressure to undertake or complete the flight against personal inclination.
18. Under the influence of alcohol/drugs (see Medical Factors).
19. Aware the aircraft was being operated illegally.

B. Factors Affecting Crew Coordination and Monitoring

1. Monitoring crewmember lacked sufficient authority.
2. Monitoring crewmember ignored or disregarded by person flying aircraft.
3. Monitoring crewmember overridden.
4. Monitoring crewmember distracted by other tasks.
5. Monitoring crewmember lacked experience of procedure/maneuver being followed or flown.
6. Monitoring crewmember unaware of intended flight path.
7. Monitoring crewmember insufficiently provided with means to perform his monitoring function.
8. Crew inadequately briefed by commander.
9. Company monitoring instructions inadequate or poorly defined.
10. Crew activities not coordinated.

C. Factors Affecting Perception of External Visual Situation

1. External visual cues inadequate/insufficient to perform maneuver being attempted.
2. External visual cues not in accordance with pilot's expectations on becoming visual.
3. Vision restricted (cockpit structure).
4. Vision restricted (atmospheric).
5. Position of external visual situation relative to cockpit window frames abnormal/unexpected.
7. External visual situation misinterpreted by pilot.
8. Airport lighting too bright.
9. Glare (other than lighting).
10. Unaccustomed to runway width.
11. Disorientation due to longitudinal acceleration (somatogravic effect).

D. Factors Affecting Flow of Information

1. Pilot provided with insufficient information to conduct the maneuver/operation attempted.
2. Information provided was incorrect.
3. Information provided was correct but wrongly transferred.
4. Information provided not acted upon.
5. Information provided had unsettling effect on crewmember(s).
6. Excessive concentration required to absorb information and this affected the performance of the individual.
7. Information not required for the performance of the task was too obtrusive and affected crewmember's concentration.
8. Information provided was not in accordance with expectations.
9. Information not believed.
10. Information provided at too high a rate (overloaded).
11. Information excessively difficult to acquire.
12. Crewmember inattentive.

E. Factors Affecting Fatigue/Arousal State

1. Large change of time zone.
2. Rest period not used properly.
3. Excessive flight hours during recent period.
4. Other duties (e.g. management) too demanding or time consuming.
5. Insufficient food eaten recently or unbalanced diet.
6. Side effects of medication (see **Medical Factors**).
7. Heavy smoker.
8. Cabin temperature uncomfortable.
9. Cabin humidity uncomfortable.
10. Cabin noise level too high.
11. Flight deck station uncomfortable.
12. Personal aircrew equipment uncomfortable.
13. Flight conditions uncomfortable.
14. Sun glare.
15. Control of aircraft physically demanding.
16. Excessive delays to schedule.
17. Normal sleep pattern interrupted.

F. Factors Affecting Work Load

—The activity of each crewmember in the period leading up to the accident and the time taken by each individual to perform each task relative to a common time base.

G. Medical Factors

Incapacitation

1. Sudden total.
2. Sudden partial.
3. Insidious total.
4. Insidious partial.

Causes of Performance Degradation

5. Side effects of medication.
6. Acute anxiety.
7. Pain.
8. Dietary inadequacy.
9. Vision defect (including failure to wear corrective lenses).
10. Cardiac condition.
11. Gastro-intestinal condition.
12. Respiratory condition.
13. Ear, nose, throat condition.
14. Genito-urinary condition.
15. If female, relevance of menstrual cycle.
16. Central nervous system condition.
17. Psychiatric condition.
18. Alcohol.
19. Phobic condition.
20. Hyperventilation.
21. Anoxia.
22. Hypoxia.

QUICKSTOPPERS

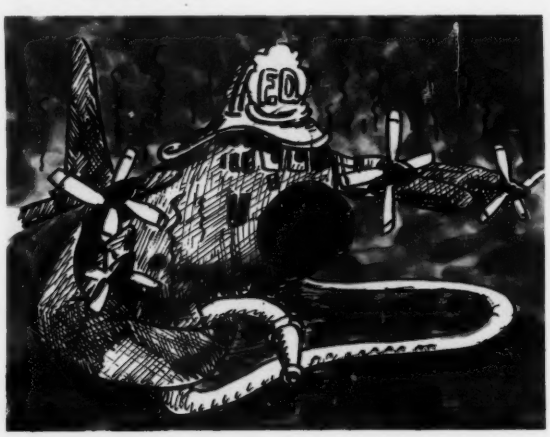
CHIPS ANYONE?

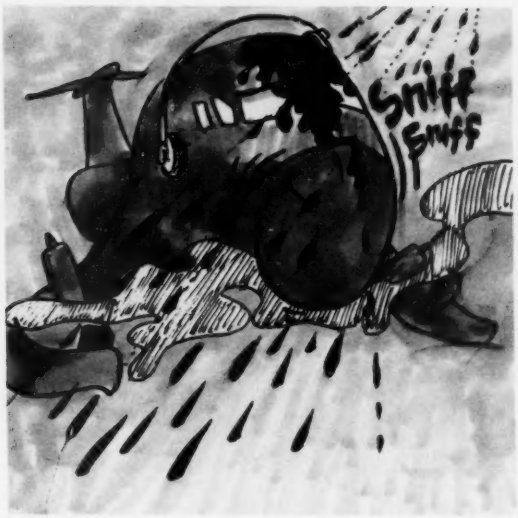
The crew of the C-12 completed a touch-and-go landing and were climbing through 1,500 feet enroute to 3,000 feet when the right engine chip detector light illuminated. The crew elected to continue the climb to 3,000 feet before shutting down the affected engine. They declared an in-flight emergency with ATC and returned to their departure base and landed uneventfully.

The crew turned the aircraft over to maintenance and the able maintainers discovered no less than 10 pieces of nugget-shaped magnetic matter attached to the chip detector. Further investigation revealed the oil screen was full of metallic particles. Additionally, the engine power section was hard to rotate and, when rotated, was accompanied by a grinding noise. The fix was to R and R the air frame oil cooler and overspeed governor and clean all airframe components associated with the engine oil system. The moral to the story? Don't take those chip lights—lightly.

THE HEAT IS ON!!!

The Hercules was on a routine overwater navigation mission when the master fire-warning-light blinked twice—without a corresponding light in any of the fire handles. Approximately 30 seconds later, the light illuminated again but this time stayed on and the number 2 fire handle also illuminated. The crew shut down the number 2 engine and aborted the mission. The subsequent approach and landing were uneventful. The next day, maintenance folks inspected the aircraft and found no sign of fire so they "R & R'd" the fire control unit. This action seemed to have corrected the problem *this time*, but in light of the rash of false fire indications experienced across the C-130 fleet, the stalwart maintenance pros sought the reason for the failure of these fire control units. After exhaustive investigation, the investigator and maintenance team determined the answer might be related to moisture in the fire control box connector plugs. It seems that there is a significant reduction in false fire warning indications when conventional connector plugs are replaced with environmental connector plugs. Though only in the theoretical stage, elimination of moisture in the connector plugs may be the key to eliminating this troublesome problem.





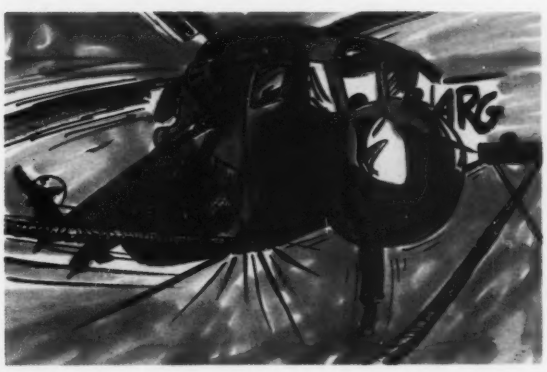
PLAY "MISTING" FOR ME

This C-141 was number 2 in a three-ship SKE formation, preparing to airdrop heavy equipment platforms. Seconds before extraction, the loadmaster smelled something "funny" in the cabin area. He advised the IP of the presence of smoke and fumes in the rear of the aircraft. The crew donned either oxygen or smoke masks and the pilot called "no drop."

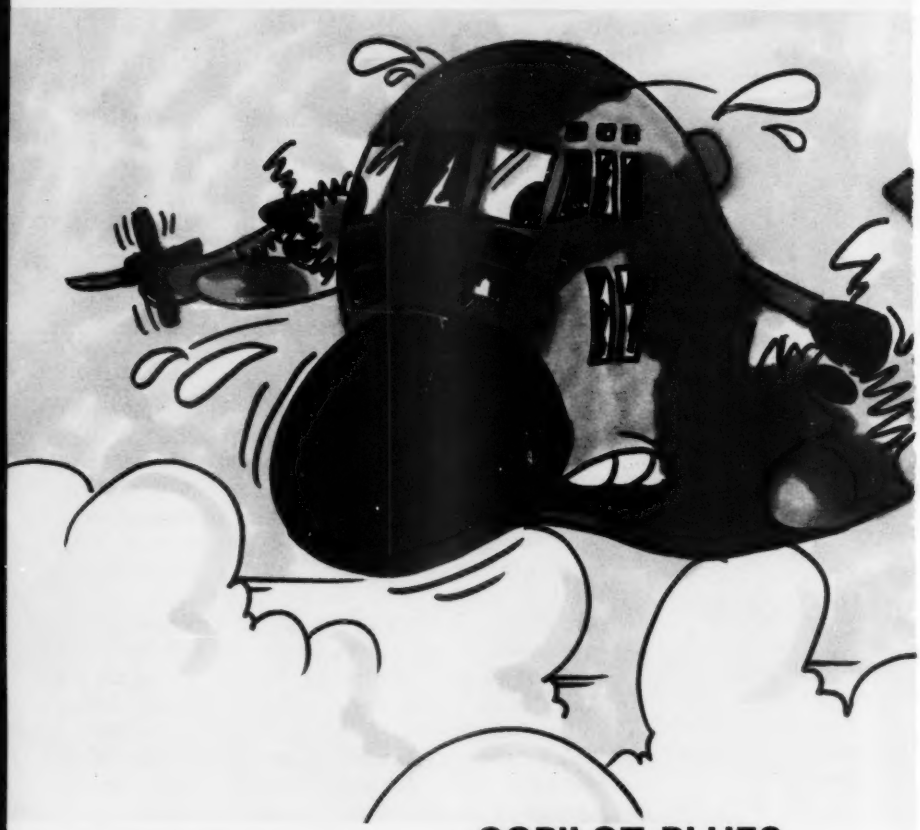
Meanwhile, the loadmaster set about the task of locating the source of the toxic fumes. The culprit was hydraulic fluid misting from the number 3 hydraulic system in the cargo door's manual override system. Using the pilot's "all doors" switch, the crewmembers closed the petal doors before the number 3 hydraulic system was depleted of fluid. The pilot planned and successfully completed an approach flaps landing using a 3-point touchdown and an airspeed 10 knots faster than normal to avoid striking the still-opened cargo door on the runway. Postflight maintenance troubleshooting revealed the source of the problem—a leaking flow control valve in the cargo door's manual override system.

CROSSED WIRES

The H-53 formation launched on what the crews anticipated to be a routine, low-level, two-ship training sortie. The IP of the number 2 aircraft was demonstrating a "new" gliding maneuver to the right-seater to be followed by a right-breaking 180° turn. Both aircraft began the glide at approximately 350 feet AGL. Lead initiated the turn at 200 feet using about 60° of bank when suddenly a large set of power lines filled the wind screen. The lead aircraft commander calmly alerted his wary wingman. The wingman acknowledged lead's warning and started his turn using 70° to 80° of bank in order to keep the lead aircraft in sight. Unfortunately, as the wingman increased his bank angle, he also allowed the nose of the helicopter to dip down. This, in turn, allowed the aircraft to descend, placing the powerlines directly in his path. The wingman attempted to roll level using full left cyclic, full left pedal, and nearly full-up collective. The straining Super Jolly rolled slightly left and the aircraft nose leveled on the horizon. Recognizing his aircraft was about to become one with the powerlines, the IP of number 2 continued to flare the aircraft. The wire contacted the helicopter at the fuselage just below the right seat and skidded along the aircraft belly. Amazingly, the aircraft and crew survived this mishap, sustaining only minor damage to the aircraft—but *this one* was too close for comfort.



QUICKSTOPPERS



COPILOT BLUES

This C-130 was departing on the third and final leg of their round-robin flight. Everything was normal until the aircraft was 50 feet off the deck when the flight engineer notified the AC the number 4 engine had flamed out. The AC directed the copilot to shut down the number 4 engine and advanced the operating engines to maximum power. Just another run-of-the-mill critical emergency during takeoff, right? Wrong!

The unsuspecting copilot inadvertently selected the *number 1* engine condition lever and, without waiting for the prebriefed confirmation of the proper lever from the FE, moved it toward the feather position. Luckily, the copilot caught the error of his ways before the number 1 engine condition lever reached the fea
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AFTER DEADLINES

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